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ABSTRACT

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Changing Preschoolers' Attitudes toward Animals: A Zoo Program and an Evaluation

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Running head: PRESCHOOLERS' ATTITUDES TOWARD ANIMALS

Abstract

A zoo outreach program for preschoolers was evaluated by an assessment of the reactions of the children themselves. Children's attitudes toward certain animals were measured before and after live exposure to those animals in regular preschool settings. The attitudinal measure was a nonverbal expression of affect as elicited by pictures. Additionally, there was a measure of subjects' awareness of certain information about animal body coverings and other features of anatomy. The results indicated that there were more positive affective reactions to the animals' pictures after live exposure than before, and that children's awareness of animal anatomy had increased. A discussion of the results centered on the validity of the current measures, and ended with recommendations concerning future approaches for zoo outreach programs aimed at preschoolers.

Changing Preschoolers' Attitudes toward Animals: A Zoo Program and an Evaluation

Zoo and aquarium educators are charged with both the development and the implementation of educational programs for the general public. A third and equally important task is the evaluation of these programs. The job of the evaluator is to produce optimal information or feedback to funding agencies, patrons, staff members, and others with a stake in program progress, outcome, and success (Henerson, Morris, & Fitz-Gibbon, 1978, p. 9). A number of American zoos provide young children in preschools with educational experiences involving live animals. Evaluations of this sort of outreach are usually based on the judgments of the teachers or other adults attending the program. The present study departs from this approach by examining the reactions of children themselves.

This paper will focus on an evaluation of a recent outreach program conducted by educators at the Indianapolis Zoo. The aim of the program was to enhance preschoolers' attitudes toward certain animals. Young children were given brief but direct exposure to live examples in preschool settings. The point of the evaluation was to determine whether children's attitudes were indeed influenced by the exposure. Each child's attitudes were measured twice: shortly before contact with the live animals, and shortly after the contact.

Attitudes are considered to be emotionally toned dispositions to react in a consistent manner toward ideas, situations, objects, or persons. These dispositions can be established or changed as a consequence of experience, instruction, or communication. Depending on the circumstances, attitudes can play an important role in regulating one's overt behavior (Rajecki, 1982). In

terms of the interests of zoo and aquarium officials, it can be assumed that active public support of preservation or conservation facilities is based in part on public opinion (attitudes) regarding such resources. Given the extent of the connection between attitudes and actions, it is worthwhile to study not only adult opinions, but also the origin and development of attitudes in the young toward a variety of animals. Hence our interest in the possibility of measuring and influencing preschooler's reactions.

A common conceptualization of attitudes is that they are composed of up to three "components," sometimes referred to as the A-B-Cs. The A, or affective, component represents an emotional or evaluative aspect (e.g., "I like X."); the B, or behavioral, component represents an intentional aspect (e.g., "I'll buy X."); and the C, or cognitive, component represents a relational or causal aspect (e.g., "X produces profits."). Different theorists argue for different combinations of these components as essential to an understanding of attitudes, but apparently all respectable theories include the A (affective) element (see Rajecki, 1982, pp. 33-48). In any event, where children are concerned, affect is probably the most accessible component, and it is around the affective element that an instrument for preschoolers was designed.

Even so, the measurement of any aspect of young children's attitudes poses some special problems as outlined by Goodwin and Driscoll (1980): (a) young children may have mercurial attitudes, (b) young children lack some of the skills necessary for techniques used in assessing attitudes of older persons, (c) young children are eager to please and may give socially desirable answers, (d) young children may exhibit a response set such as "yea-saying," and (e) young children have

a limited attention span. It was with these characteristics in mind that we created certain test materials and procedures.

In addition to measures of their affective reactions, all children were also tested for their knowledge of particular facts about certain animals.

Method

The Program

From November, 1984 to March, 1985 the Indianapolis Zoo conducted an outreach educational program that was given the overall title of "Beasts and Little Tykes." There were two versions within the project: "Animal Wrappers," which emphasized body coverings, and "Creature Features," which emphasized animal senses. The program sessions were one hour in length and provided direct experience with four live animals for children in their regular preschool settings. The number of children present at given sessions ranged from 14 to 28, and adult school staff members were in attendance at all times during exposures. All children were exposed to a box turtle and a boa constrictor. In addition, "Animal Wrappers" groups were involved with a parrot and either a ferret or a rabbit; while "Creature Features" participants had contact with a screech owl and an alligator. The choice of species had to do with the version that was being presented, and the day-to-day availability of actual animals.

The Zoo's early childhood specialist -- the first author -- introduced and handled the program animals in the following order: bird, alligator or mammal, box turtle, and boa constrictor. Children and adults were encouraged, but not forced, to touch each animal. The specialist voiced pertinent factual information about every beast (e.g., "Birds do not have teeth."), but much of

her conversational replies and statements about each animal consisted of favorable comments in an effort to eliminate fears and foster positve attitudes. Thus the rationale behind this part of the program was that brief but direct experience of this sort, coupled with positive persuasive communications, might enhance (improve) children's attitudes toward the animals.

Along with live animals, children were also given direct exposure to a variety of animal objects. In the "Animal Wrappers" version participants handled several different bird feathers, a patch of camel hair, and a shed snake skin. The "Creature Features" version provided direct experience with a bird beak, a leopard skull, and a head portion of a shed snake skin. These props were used throughout the programs to introduce and clarify specific points.

The Sample

The "Beasts and Little Tykes" program was advertised through a direct mailing sent to 254 preschools in the greater Indianapolis area. Since it was available on demand, the Zoo staff could dictate neither the nature of the facility, nor the sex, age, race, or any other characteristic of a child in a particular program. In the year in question a total of 2,215 children participated, which proably represents a cross-section of preschoolers in this area.

Because of limitations on resources and personnel, a prior decision was made to test only about ten percent of all the children in the program. From the entire pool, 194 subjects were identified for inclusion in a pretest and posttest evaluation. This sample was not unlike the complete set of participants.

Demographic details of the sample are found in Table 1. Children were

Insert Table 1 about here

included who were enrolled in a variety of settings or sites: a privately owned preschool and daycare center (n = 26); preschools operated by churches (n = 69); a preschool for gifted and talented children (n = 14); a federally-funded (Head Start) preschool program (n = 64); and a resident school[1] for deaf children (n = 21). The inclusion of a subject was not determined on the basis of the individual child, but rather at the level of the school (test site). A school qualified as a test site if the site official: (a) granted permission to conduct the evaluation tests, and (b) volunteered class rosters that contained the name, age, and class schedules of pupils. Parental permission was also required for children in the Head Start program.

Instruments

Affective instrument. The affective instrument amounted to a nonverbal, self-report measure. Four pages of a test booklet displayed separate drawings of the four animals to which particular children would be exposed. To help children understand what was expected of them, response options were presented in picture form rather than words. For example, to elicit a child's affective reaction to a snake, he or she was shown the drawing in Figure 1. Also seen in

Insert Figure 1 about here

the figure are three schematic faces: smiling, neutral, and frowning. The child was told the name of the depicted animal, and was directed to point to the face

that showed how he or she felt about that animal (e.g., "This is a snake. Point to the face that shows how you feel about the snake."). Selection of the smiling face was taken to indicate a positive affective reaction; selection of the neutral face was understood as indifference; and selection of the frowning face was interpreted as a negative affective reaction.

Three other pages in a test booklet displayed drawings of the remaining animals involved in given versions of outreach sessions, but which were not exposed to particular children. These included some combination of a parrot, an alligator, an owl, a ferret, or a rabbit. The order of presentation of the seven pictures was: parrot, alligator, ferret, owl, snake, rabbit, and turtle.

In all cases a practice page preceded the affective instrument. That page displayed only the three schematic faces and was used to introduce children to their meanings. The child was given a verbal explanation of each face (e.g., "This face has a smile. It shows you how you look when you feel good."). After hearing the three explanations, the child pointed to a specific face in response to a directive (e.g., "Point to the face that shows how you look when you feel good."). Explanations were repeated until the child correctly responded to each directive, thus indicating an understanding of the meaning of each face. This general procedure, and the schematic faces themselves, were borrowed from Henerson et al. (1978, p. 63). An instrument of this sort is similar to those reported in other areas of the child development literature (cf. Borke, 1971, 1973). The drawings of animals were taken from a copyright-free source book (Harter, 1979).

Informational instrument. A test booklet also included three pages of drawings of animals that were meant to tap a child's knowledge of particular facts about certain animals. These facts were those that were intentionally

presented by the specialist during the hour-long sessions. There were two or three animals depicted on each of the three informational pages, as illustrated in Figure 2. The child's task was to respond to certain directives by pointing

Insert Figure 2 about here

to the animal in a picture that represented the correct answer or identification. Of course, there were different directives and pictures employed in the two outreach versions, and these are listed in Table 2. Presentation of the

Insert Table 2 about here

informational instrument preceding the administration of the affective instrument.

Procedure

The eleven-page instrument was administered on an individual basis before and after the educational program. These individual tests did not exceed ten minutes in length. Pretests were administered during a two-week period prior to a program date, and posttests were conducted within five days of a program. Zoo education staff and volunteers administered the test instrument at selected sites. Teachers at the Indiana School for the Deaf conducted pretesting and posttesting because of their pupils' lack of verbal language.

Design and Statistical Considerations

Affective measure. Ideally, the data from a study such as this would be cast in a balanced analysis of variance design. A formal factorial design would completely cross program versions, schools, race, age, and sex. However, given the necessarily haphazard design of this field research, such an elegant

approach is unworkable. Reference to Table 1 shows that demographic characteristics alone were represented in a very uneven fashion. Worse, different program versions presented different animals, and there were even different presentations within versions. Clearly, a parametric analysis is not feasible.

Because of the nature of the data we decided to attempt a compromise between conceptual rigor and reality by collapsing over all demographic variables, and by adopting a nonparametric approach to the affective scores. Since each of the 194 children was measured twice on each of four program animals, this represented an opportunity for 776 separate shifts on the attitudinal measure. Whatever the child's affective response on the pretest, there was the possibility of a different affective response on the posttest. Of course, there was also the possibility of the same affective response on both tests. The question is, if a shift occurred, was it more likely to be in a positive or in a negative direction? Patterns of shifts in affective responses will therefore be reported and analyzed for each of the separate animals that were exposed.

Further, every child gave pretest and posttest affective responses to drawings of three animals that were not encountered live in a particular program session. It can be said that they represent a kind of "control" set of stimuli, and patterns of shifts for these nonexposed animals will also be reported.

Informational measure. An incorrect answer on an informational item was arbitrarily assigned a zero (0), and a correct answer was assigned a score of one (1). For this measure a child was scored twice as either correct or incorrect on each of three questions, yielding a set of six numbers per subject. Even such complex dichotomous data have traditionally been handled by nonparametric

tests such as chi-square. But as Lunney (1970) points out, although complex chi-square tests may exist, their computation is difficult. As an alternative, Lunney (1970) recommends the application of standard analysis of variance (ANOVA) designs, and has provided empirical demonstrations that various ANOVA models -- including nested designs -- are robust enough to accommodate binomial data where sample sizes are relatively large. Following this lead, we attempted to analyze the informational data by employing a conventional ANOVA computer statistical program.

Results

Affective Measure

Exposed animals. A child's selections of the frowning, neutral, or smiling face as affective reactions were assigned scores of 1, 2, and 3, respectively. Average scores per exposed animal are shown in Figure 3. It

Insert Figure 3 about here

can be seen that affective scores were generally higher on the posttest (overall M = 2.34) than on the pretest (overall M = 2.15). This impression is borne out by a nonparametric analysis of shifts. Out of a total of 776 possible shifts, pretest to posttest shifts occurred in 361 of the cases (47%). The upper part of Table 3 presents a list of exposed animals, the number of children

Insert Table 3 about here

who saw and evaluated each of those animals (n), the number of positive and negative affective shifts per animal from pretest to posttest, and a z score

resulting from an application of a sign test[2] to a pattern of shifts. An analysis of total shifts for exposed animals is also presented. As indicated in the upper part of Table 3, there were significantly more positive than negative shifts for four of the seven exposed animals, and no cases where negative shifts substantially outnumbered positive ones. As for total shifts, there were far more positive than negative for the exposed animals.

It is also interesting to take note of features of the 415 pretest to posttest comparisons over which shifting did not occur. Of these, 265 (64%) involved scores of 3 and 3 before and after exposure to the animals in question. This implies that the outreach program did not necessarily reduce subjects' affective reactions when those reactions were already positive. It also speaks to the stability of positive reactions, at least when measured this way. Scores of 2 and 2, and 1 and 1 made up 14% and 22%, respectively, of the remainder of the total of 415 no-shift cases.

Nonexposed animals. The overall average ratings for the nonexposed animals also showed an improvement from the pretest ($\underline{M}$ = 2.24) to the posttest ($\underline{M}$ = 2.36), but this contrast was not quite as sharp as that for the exposed animals. This comparison is revealed in the lower part of Table 3. Whereas four of seven (57%) of the exposed animals were associated with significant numbers of positive versus negative shifts, only one of five (20%) of the nonexposed types was so. However, in analyzing the total, positive shifts again outweiged those that were negative.

Informational Measure

Of the total of the 194 children in the study, 148 participated in the

"Animal Wrappers" version and 45 were exposed to the "Creature Features" version (and one subject was lost to this analysis because of missing data). The percent correct responses from pretest to posttest on the informational items used in these versions (see Table 2) are shown separately in Figure 4. The two data

Insert Figure 4 about here

sets were each analyzed in a 2 X 3 analysis of variance having two within-subject comparisons: tests (2 levels) and items (3 levels).

For the "Animal Wrappers" subjects, all possible comparisons were significant: there was a main effect for tests, F (1, 147) = 32.46, $p < .001$; a main effect for items, F (2, 294) = 26.16, $p < .001$; and an interaction between tests and items, F (2, 294) = 18.23, $p < .001$. In practical terms these effects mean that (a) there generally was improvement over tests, (b) the items differed in their inherent difficulty, and (c) the most improvement occurred on the item that was initially most difficult.

For the "Creature Features" subjects, two contrasts were significant: there was a main effect for tests, F (1, 44) = 10.09, $p < .01$; and a main effect for items, F (2, 88) = 4.16, $p < .02$. The interaction between tests and items failed to reach conventional levels of significance, F (2, 88) = 1.38, $p > .25$. This means that (a) there was again general improvement over tests, (b) these items also proved to be unequal in difficulty, and (c) the improvement over tests was roughly parallel over items in this version.

As a point of passing interest we inquired about the possible correlation between shifts on the affective measures and improvement on the informational items. A net change score on both indexes was calculated for every subject, and these pairs of values were compared. Given the nature of the affective and

informational measures, nothing in theory would suggest that they should be strongly related, and this turned out to be the case empirically. The correlation coefficient (*r*) between affective and informational changes for the "Animal Wrappers" sample was .14; and that for the "Creature Features" subset was .09.

Discussion

Although we recognize that demographic factors are important in many areas in education and psychology it was not the point of this study to examine such factors. Rather, our aim was to try to evaluate a program that is meant to be used (within the preschool range) regardless of demographic characteristics. For the present purpose, race, age, and sex can be viewed as "random variables." The existence of random variables confers a certain advantage to an applied research project. According to Martin (1985): "The major advantage of using random variables is the generalizability of results. ... If we make a circumstance into a random variable and randomly select levels from a population, we can generalize the results to that entire population" (p. 7). In any event, inspection of the affective data did not reveal strong or consistent trends for demographic variables.

What, then, of the results? The shift data for the exposed animals indicated more positive affective reactions after exposure than before. Of course, we would be inclined to attribute this difference to the impact of the outreach program. But it remains the case that there was also some positive shifting in the data for the nonexposed animals. How can one account for these latter shifts? Could they have occurred due to some artifact in the evaluation methodology or procedure? If so, might the nonexposed shifts vitiate claims based on shifts for exposed animals?

On the contrary, it is our judgment that (a) the affective instrument provided a valid measure, (b) the impact of the program was real, and (c) it may be likely that the shifts for the nonexposed animals were a generalization from the shifts for the exposed animals.

First, the validity of the affective measure is suggested by the ordering of the means over animals as seen in Figure 3. Based on intuition alone one might expect children to have more positive reactions to rabbits than to alligators or snakes, and, in fact, that was the result on the pretest and the posttest. The order of exposed animals in the list in the upper part of Table 3 simply reiterates the order of pretest means in Figure 3. Furthermore, that same approximate ordering occurred for the pretest means for the nonexposed animals, and that ordering is indicated in the lower part of Table 3. Clearly, the affective instrument measured something, and apparently in a meaningful way.

Second, did the program have real impact, or might all the affective shifts be due to some artifact, such as increased desire to please the Zoo staff? The data from the informational measure speak to this point. Children seemed to know more about the animals after exposure than before, and it is hard to attribute this change to the social desirability of certain responses.[3] Even if a child desperately wished to please a tester, he or she needed some factual information to do so, and presumably that knowledge was gained during the exposure. To this extent the program did have an impact, and thus could have influenced affect.

Third, if the measure was valid and the program was impactful, to what to attribute the shifts for the nonexposed animals? We wish to argue that those

shifts could have been due to some generalization or spread of effect from the exposed animals. After all, children were tested on the "control" stimuli at the same time and in the same context as when tested on the critical animals, and this might account for the generalization. At the very least, shifting on the nonexposed animals seemed weaker than shifting on the exposed animals. Still, to definitely answer this question it will be necessary to create special control groups and procedures in the future.

For the time being we can tentatively conclude that outreach educational programs such as "Beasts and Little Tykes" of the Indianapolis Zoo can have their intented effect. Zoo administrators and educators who are implementing similar programs can take encouragement from these results. Those not yet serving the preschool audience may consider these findings as support for a decision to increase their outreach educational offerings.

The techniques in this project represent an effort to better understand how attitudes toward animals develop during early childhood years. Even so, the attempt at evaluation had limitations, so its real value may rest in the possibilities it opens for further investigation. Several variations on the current project suggest themselves. Are live animals really the best means for this sort of communication, or would literal or anthropomorphized pictures do as well or better? Compared with self-report data, might behavioral measures -- facial expressions, posture, movements -- be more sensitive to children's attitudes? Further, what is the optimal group size for such instruction? Answers to any or all of these questions will prove valuable to workers in outreach programs.

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Author Notes

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Requests for reprints should be sent to the Education Department, Indianapolis Zoo, 3120 East 30th Street, Indianapolis, Indiana, 46218.

Footnotes

[1] The resident school for deaf children was not a preschool in the accepted sense, but data from this site was retained for consideration for two reasons. First, although the deaf children were older, on average ($\underline{M}$ = 5.9 years), than the rest of the sample, theirs was not a conventional elementary school. Second, the inclusion or exclusion of the data from this subsample does not affect the general pattern of results of the study.

[2] The validity of a sign test rests on the assumption that observations are independent of one another. It could be argued that this assumption is violated here to the extent that some of the positive and negative shifts came from the same subject. On the other hand, the assumption of independence is upheld to the extent that each subject's shift was elicited by a different animal. We urge tolerance for this ambiguity as part of the compromise between conceptual rigor and reality in this field study.

[3] Children from disadvantaged backgrounds might be expected to do less well than others on factual items. That was the case here: the Head Start pupils gave the lowest overall percent correct informational answers in both outreach versions, which lends some validity to the informational instrument.

Table 1. Distribution of the sample of children by race, sex, and age.

Sex	Age				
	3	4	5	6	7
Black children					
Male	9	17	10	0	0
Female	9	13	5	0	1
White children					
Male	4	36	12	3	3
Female	5	45	12	5	5

Table 2. Informational items including directives and options (picture content) by program version.

Directive	Picture content
"Animal Wrappers"	
1. "Point to the animal that has fur."	alligator, camel, turkey
2. "Point to the animal that has feathers."	lion, parrot, snake
3. "Point to the animal that has scales."	peacock, turtle, zebra
"Creature Features"	
1. "Point to the animal that has ears."	alligator, snake
2. "Point to the animal that has no teeth."	alligator, owl
3. "Point to the animal that uses its tongue for smelling."	snake, turtle

Table 3. Positive and negative shifts in affect scores per animal.

Animal	n	Shift		z score	p
		Positive	Negative		
Exposed animals					
Rabbit[a, b]	22	7	3	.95	ns
Parrot	148	26	32	-.66	ns
Turtle	194	54	32	2.26	.02
Ferret	126	46	18	3.38	.01
Owl	46	17	5	2.34	.01
Alligator	46	12	12	.20	ns
Snake	194	64	33	3.05	.01
Total	776	226	135	4.74	.01
Nonexposed animals					
Rabbit[a]	171	33	28	.51	ns
Parrot	46	15	8	1.25	ns
Owl	148	33	33	.12	ns
Ferret	69	24	12	1.83	.03
Alligator	148	36	30	.06	ns
Total	582	141	111	1.83	.03

[a] Different children were shown different animals, so a given animal -- rabbit, say -- was an exposed animal for some and a nonexposed animal for others.

[b] The order of animals from top to bottom in this list (from rabbit to snake) is simply a reiteration of the order of pretest means seen in Figure 3.

Figure Captions

Figure 1. Sample test booklet page showing a drawing of a snake and three schematic faces for the measurement of children's affective reactions to that animal.

Figure 2. Sample test booklet page showing a drawing of an alligator and an owl for the measurement of children's knowledge about certain animals.

Figure 3. Average affective scores at the pretest and the posttest for the entire "Beasts and Little Tykes" program evaluation.

Figure 4. Percent correct answers to informational items at the pretest and the posttest for the "Animal Wrappers" and "Creature Features" versions in the evaluation.

Figure 1

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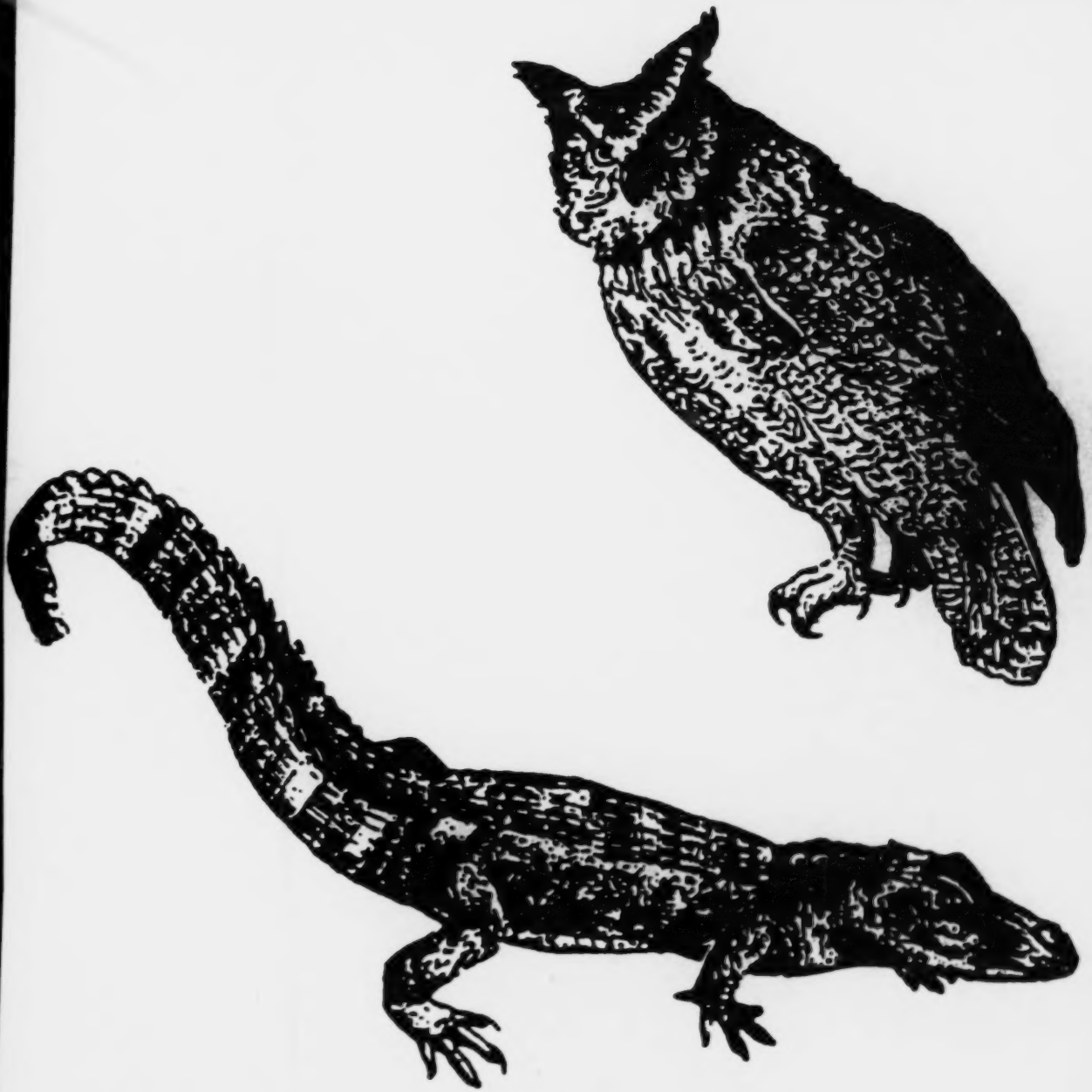
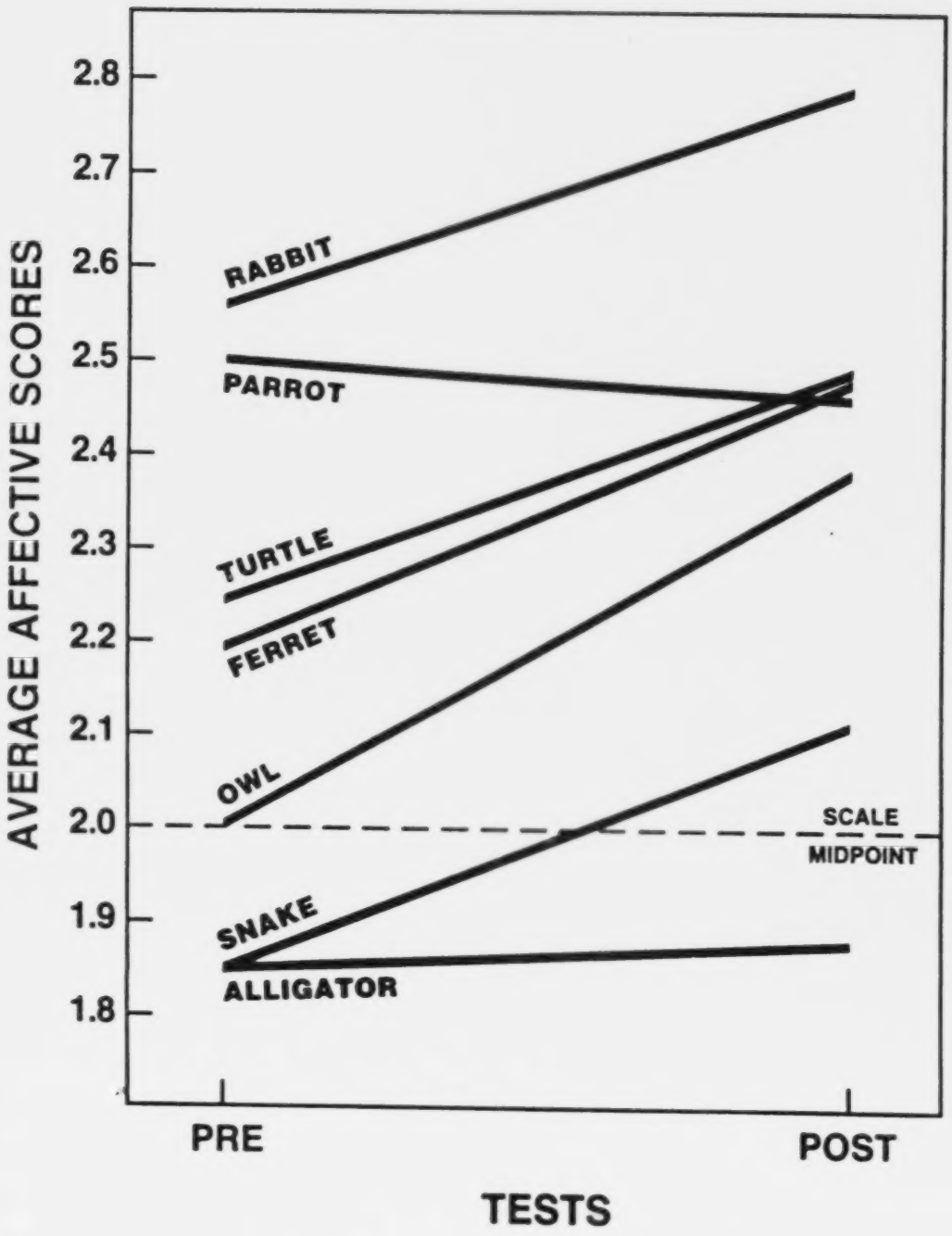


Figure 3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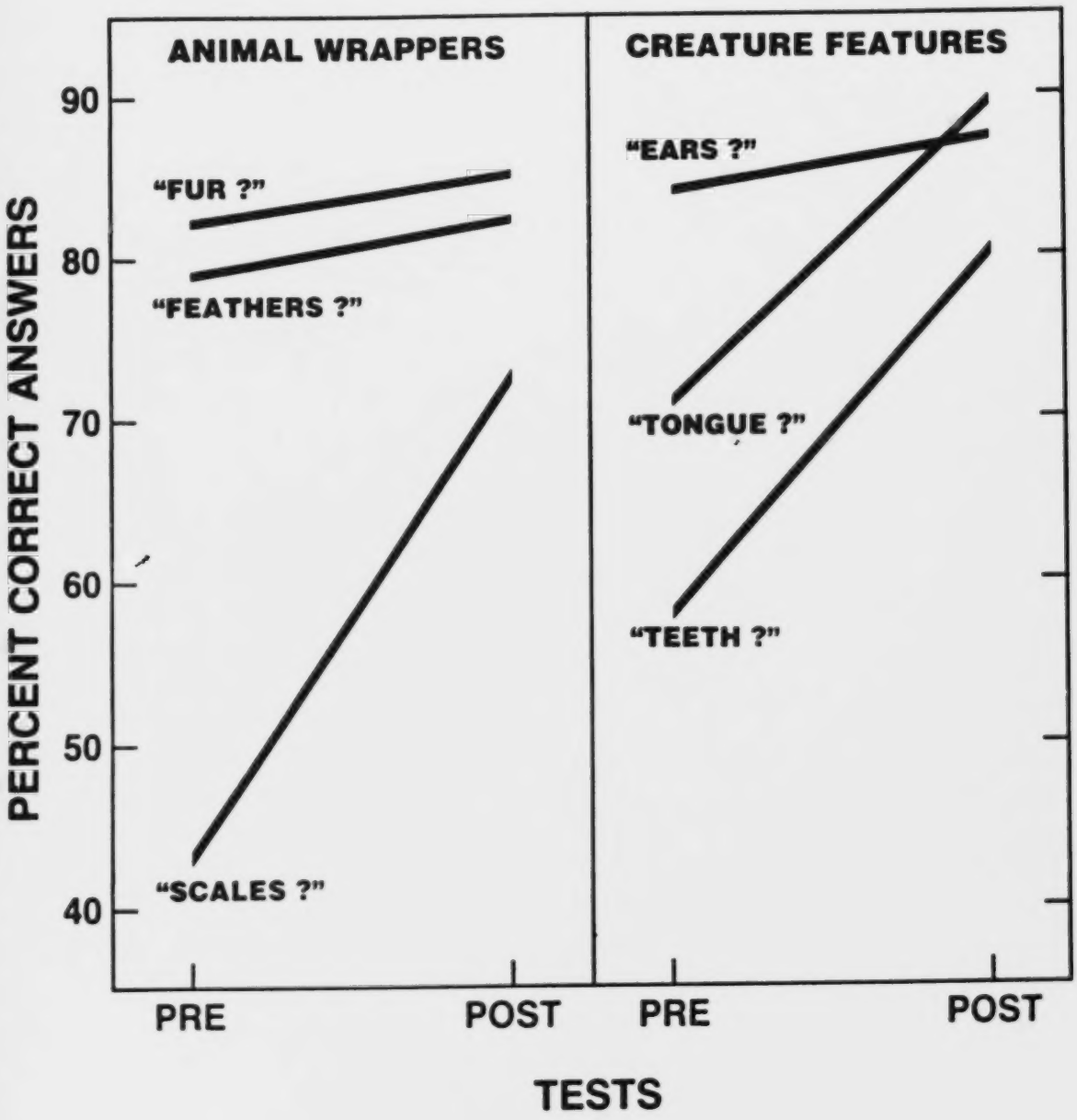
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